Environment, Safety & Health SECTION

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# Are you a Beryllium-Associated Worker?

## BERYLLIUM USE AT FERMILAB

Beryllium is an excellent material to use around accelerator beams. It is light, strong, easy to machine, has a high melting point, exceptional thermal conductivity, and produces little residual radioactivity. Not surprisingly, Fermilab has made regular use of this material. During the heyday of Fixed Target operations, beryllium was often used as a target material, particularly in the Neutrino Beamline. In these applications, small blocks were packed together to achieve the desired shape. When not in use, metallic beryllium has typically been warehoused in a centralized storage location, though this location has changed over time (see right→). In the current Collider era, beryllium is used near particle collision areas. At CDF and D0 for example, the beam pipes and central detector supports are made from beryllium. Fermilab also employs beryllium in ways that are more typical of industrial applications. For example, beryllium oxide is used in heat sinks; and beryllium-copper alloys are employed as conductors, contacts, springs, and spark-proof tools. See the list at the end of this sheet for some of the better-known onsite use locations.

**Storage areas for beryllium blocks used in physics experiments**

| 1978 to 1986 | 1986 to 1992 | 1992 to present |
|---|---|---|
| Storage shed behind Lab 8 | Neutrino Target Service Building | ME7 Worm |

***DOE's Chronic Beryllium Disease Prevention Program Rule***
*http://tis.eh.doe.gov/be/berule.pdf*

***Fermilab's Beryllium Associated Workers Web Page***
*http://www-esh.fnal.gov/owa_user/esh_home_page.page?this_page=15129*

## BERYLLIUM DISEASE

Beryllium can cause a variety of health problems. Exposures to high levels of airborne beryllium dust can initiate a pneumonia-like response, and skin contact can produce rashes as well as prevent wounds from healing. Inhalation also carries a slightly increased risk of lung cancer. However, our primary concern rests with an allergy-like reaction. This response can result from the inhalation of even low concentrations of fine dust particles, sometimes long after exposure has ended. If this reaction advances to the symptomatic stage, it is referred to as Chronic Beryllium Disease (CBD). Recent studies suggest that sensitivity may occur in 2-5% of workers exposed to the dust, while CBD may develop in 1-3% of exposed workers. Chronic Beryllium Disease can make you feel weak and tired, and can cause difficulty in breathing. Beryllium-related disease can be severe and quality of life can suffer, but it is rarely fatal. Symptoms of CBD can be treated with steroids and/or oxygen.

## BERYLLIUM EXPOSURE AND CBD AT THE LAB

Fermilab management has always understood that beryllium is a hazardous material. As such, beryllium-related activities have been strictly controlled so that the generation of and exposure to finely divided particulate has been negligible. Occupational health research shows that CBD is almost always associated with the routine machining of beryllium. At Fermilab, most exposure would have been incidental to the bulk handling of solid objects -- from the release of surface dust -- and not from active processes such as machining, grinding, or cutting. It is believed that the likelihood of CBD resulting from Fermilab operations is extremely remote. In fact, we have never observed a single case of chronic occupational lung disease of any kind among the members of Fermilab's workforce.

## WORK(ED) WITH BERYLLIUM –NOW WHAT?

In an effort to eliminate the occurrence of CBD at DOE facilities, the Chronic Beryllium Disease Prevention Program Rule (10 CFR 850) was published in 12/1999. This standard describes mandatory exposure control measures, as well as the bases for the rule. Fermilab, in turn, has established a program that complies with DOE's CBD Prevention Rule. The other side of this sheet contains a short-cut guide for dealing with beryllium hazards at Fermilab.

## *Guide for dealing with beryllium hazards*

***If you…*** Currently work with beryllium at Fermilab, plan to do so in the near future, or simply have questions about the hazards of beryllium.

***Then…*** Visit the web sites noted on the other side of this sheet. See chapter 5052.5 of the Fermilab ES&H Manual. Consult with your supervisor, ES&H personnel in your division/section, or the ES&H Section.

***If you…*** Previously worked with beryllium, but not while employed by DOE, or a DOE-contractor[1] or subcontractor.

***Then…*** Consult with the employer for which you worked on beryllium.

***If you…*** Previously worked with beryllium while employed by DOE, or a DOE-contractor[1] or subcontractor, but are no longer employed by DOE, or a DOE-contractor[1] or subcontractor.

***Then…*** Contact Barbara Neill
Oak Ridge Institute for Science and Education
Center for Epidemiologic Research - MS45
PO Box 117
Oak Ridge, TN 37831-0117

Phone: (865) 241-6152
Tollfree: (866) 219-3442
FAX: (865) 576-9557
E-mail: *neillb@orau.gov*

***If you…*** Previously worked with beryllium while employed by DOE or a DOE-contractor[1] or subcontractor, and are presently employed by Fermilab or are working onsite as a subcontractor to Fermilab.

***Then…*** You have several options, viz.:

- ❑ *Do nothing*. You have no obligation to take any action.
- ❑ *Ask for additional information and guidance*. Feel free to talk with your supervisor, ES&H personnel, and others. They may be able to help you determine whether or not you actually handled beryllium and, if so, what risk this presents to your health. There is also a pamphlet that explains the Lab's beryllium program in some detail that is available on the internet (Fermilab web page above) and in hard copy from ES&H personnel around the Lab.
- ❑ *Pursue designation as a beryllium-associated worker*. This process includes completion of an online questionnaire, interview(s) with ES&H professionals, and one-time orientation training. If you are successful in securing the designation, you will also be given the opportunity to participate in a special medical surveillance program that includes blood testing and a chest X-ray. The process for designation as a beryllium-associated worker begins by completing the questionnaire at the following URL:

*http://www-esh.fnal.gov/owa_user/baw.html*

Simply log on, proceed to the web site, and follow the instructions. All follow up actions will be triggered by completion of the questionnaire. If you do not have ready access to the internet, please seek assistance from your supervisor, the ES&H personnel in your division/section, the ES&H Section, or others onsite.

## *Some better-known onsite beryllium use locations*

| Location | Beryllium item(s) | Location | Beryllium item(s) |
|---|---|---|---|
| A0 | Beam pipe, vacuum windows | MP9 | Be-Cu[2] wire in CMS Muon detector |
| AP0 | Targets | NLA Clean room | Small parts, mostly pre-cleaned |
| C0 | Vacuum windows | NLB SiDet | Small parts, mostly in lab hoods |
| CDF | Beam pipe | NLC South clean room | Small parts |
| D0 | Beam pipe | NLD Clean room | Small parts |
| D0 Clean room, pit, detector | Bulkheads (supports) | NuMI | Targets |
| FCC Third floor | Small ceramic beryllia[2] parts (portcards) | Railhead | Drummed parts |
| Main Injector | Vacuum windows | VL03 | Small Be-Cu[2] parts |
| MiniBoone Target Hall | Long piece in horn | | *12/2001* |

[1] *Fermilab (URA) is a DOE-contractor.*
[2] *Be-Cu contains 1-4% beryllium and Be ceramic/beryllia/BeO contains 16% beryllium.*